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N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

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Research Design

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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

Causality

A \rightarrow B
Pressure \rightarrow Ulcer

Multicausality

Years smoking \rightarrow Heart disease
High fat diet \rightarrow Heart disease
Limited exercise \rightarrow Heart disease
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

- Measure of accuracy of a study

- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

• Controlling the treatment
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

- **Controlling extraneous variables**
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

1. Is there a treatment?
   - No
   - Yes

2. Is the primary purpose examination of relationships?
   - No
   - Yes

   - Descriptive Design
   - Quasi-Experimental Study

3. Will the sample be studied as a single group?
   - No
   - Yes

   - Correlational Design
   - Will a randomly assigned control group be used?

4. Will a randomly assigned control group be used?
   - No
   - Yes

   - Is the original sample randomly selected?

5. Is the original sample randomly selected?
   - No
   - Yes

   - Experimental Study
Selecting a Descriptive Design

Examining sequences across time?
- No
  - One Group?
    - No
      - Comparative Descriptive Design
    - Yes
      - Descriptive Design
- Yes
  - Following same subjects across time?
    - No
      - Data collected across time
    - Yes
      - Single unit of study
  - Yes
    - Studying events partitioned across time?
      - No
        - Cross-sectional design
      - Yes
        - Longitudinal Study
    - Yes
      - Repeated measures of each subject
        - Yes
          - Case Study
        - No
          - Trend Analysis
A Typical Descriptive Design

Clarification → Measurement → Description → Interpretation

Phenomenon of Interest →
Variable 1
Variable 2
Variable 3
Variable 4

Description of Variable 1
Description of Variable 2
Description of Variable 3
Description of Variable 4

Interpretation of Meaning → Development of Hypotheses

Research Design
A Comparative Descriptive Design

Group I {variables measured} → Describe → Comparison of Groups on Selected Variables → Interpretation of Meaning

Group II {variables measured} → Describe → Development of Hypotheses
Selecting the Type of Correlational Design

Describe relationships between/among variables?
- Descriptive correlational design

Predict relationships between/among variables?
- Predictive correlational design

Test theoretically proposed Relationships?
- Model testing design

Research Design
A Descriptive Correlational Design

Measurement

Research Variable 1

Description of variable

Examination of Relationship

Interpretation of Meaning

Research Variable 2

Description of variable

Development of Hypotheses
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

Control Group?
- No
  - Pretest?
    - No
      - One-group post-test only design
    - Yes
      - Repeated Measures?
        - No
          - Strategy for Comparison
            - No
              - Suggest Reevaluating design
              - One group pretest/post-test design
            - Yes
              - Compare treatment & control conditions?
    - Yes
      - Repeated Measures?
        - No
          - Proceed to the next step
        - Yes
          - Proceed to the next step
Selecting The Type of Experimental Design

1. Pretest
   - No
     - Post-test only control group design
   - Yes
     - Repeated Measurements?
       - No
         - Examine effects of confounding variables?
           - No
             - Multiple sites?
               - Pretest/post-test control group design
               - Randomized clinical trials
         - Yes
           - Blocking?
             - No
               - Comparison of multiple levels of treatment
             - Yes
               - Randomized Block Design
       - Yes
         - Repeated measures design

2. Examination of complex relationships among variables in relation to treatment
   - Nested Designs
Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>PRETEST</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td></td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:**
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

**Example:** Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

**Uncontrolled threats to validity:**
- Testing
- Mortality

**Instrumentation:** Restricted generalizability as control increases
## Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected control group</td>
<td>POST-TEST</td>
<td></td>
</tr>
</tbody>
</table>

### Measurement of independent variables
- Randomly selected experimental group
- TREATMENT
- POST-TEST

### Measurement of dependent variables
- Randomly selected control group
- POST-TEST

### Treatment:
- Under control of researcher

### Findings:
- Comparison of experimental and control groups

### Example:

### Uncontrolled threats to validity:
- Instrumentation
- Mortality
- Limited generalizability as control increases
### Pain Control Management

<table>
<thead>
<tr>
<th>Traditional care</th>
<th>PRN Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit E</td>
</tr>
<tr>
<td>Unit B</td>
<td>Unit F</td>
</tr>
<tr>
<td>Unit C</td>
<td>Unit G</td>
</tr>
<tr>
<td>Unit D</td>
<td>Unit H</td>
</tr>
</tbody>
</table>

#### Primary Nursing Care

<table>
<thead>
<tr>
<th>Primary Care</th>
<th>No Primary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td>Unit B</td>
</tr>
<tr>
<td>Unit C</td>
<td>Unit D</td>
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</table>
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- **More practical**
  - Ease of implementation
- **More feasible**
  - Resources, subjects, time, setting
- **More generalizable**
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically

- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design